



CALIFORNIA NATURAL GAS VEHICLE PARTNERSHIP

Competitiveness of Natural Gas vs. Diesel HD Vehicles

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June 8, 2005

Comparison to Date

- NGVs achieve lower emissions but cost more than diesel
- “If diesel is legal – what is the incentive to be cleaner?”
- Even though NGVs cleaner – “diesel will be as clean as natural gas in 2010”
- So how competitive will NGVs be in 2010 against diesel???



CNGVP Study

- TIAx commissioned to do study
- Look at “2010” technology that is equivalent in emissions (0.2 gram NOX and 0.01 gram PM)
- Develop a Life Cycle Cost Model
- Evaluate three market segments (refuse, transit, short-haul trucks)



LCC Model

- Basic vehicle costs (including fuel storage)
- Cost of emission control technology
- O&M costs
- Fuel Costs (including infrastructure)
 - Fuel prices as function of oil prices
 - Natural gas prices as function of diesel prices
 - LNG price as function of CNG price
- Other
 - Vehicle life
 - Discount rate
 - Salvage value



LCC Model (cont.)

- Model looks at industry averages vs. user defined parameters
- Sensitivity analysis for each variable

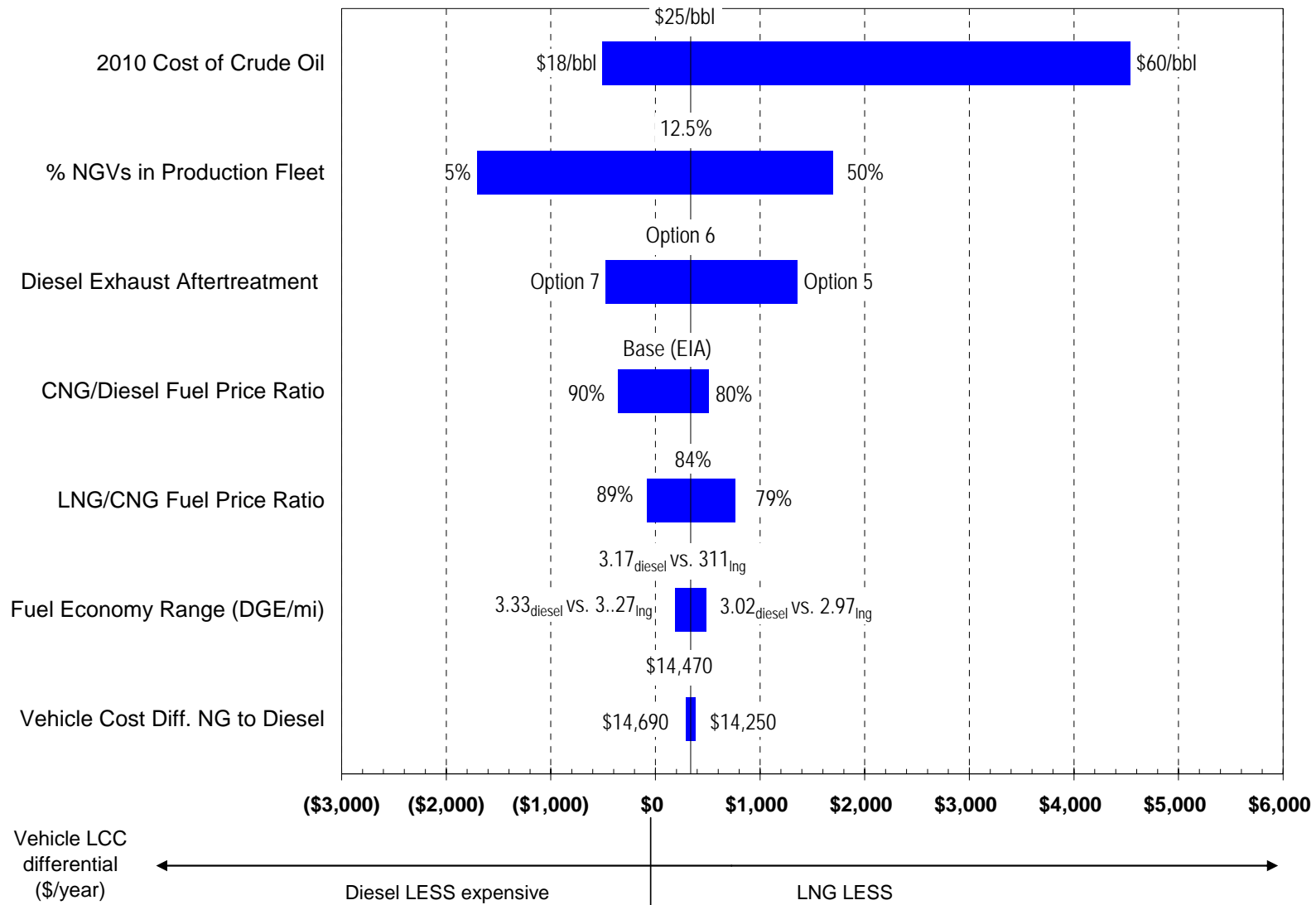


Significant Variables in Rank of Importance

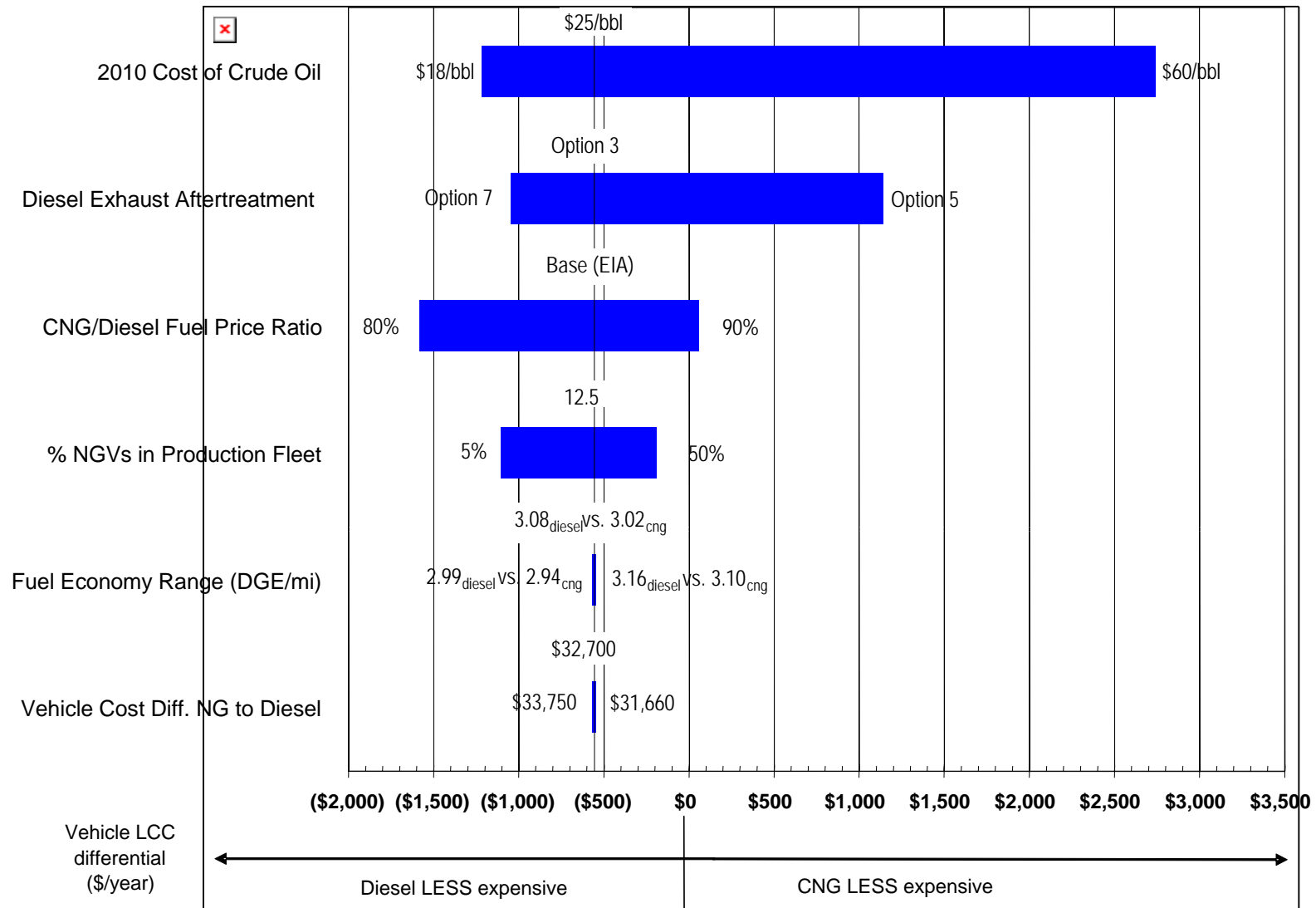
- Oil prices
- Percent of NGV market penetration (economies of scale)
- Incremental cost of diesel emission control
- Price ratio CNG vs. Diesel
- Price ratio of LNG to CNG



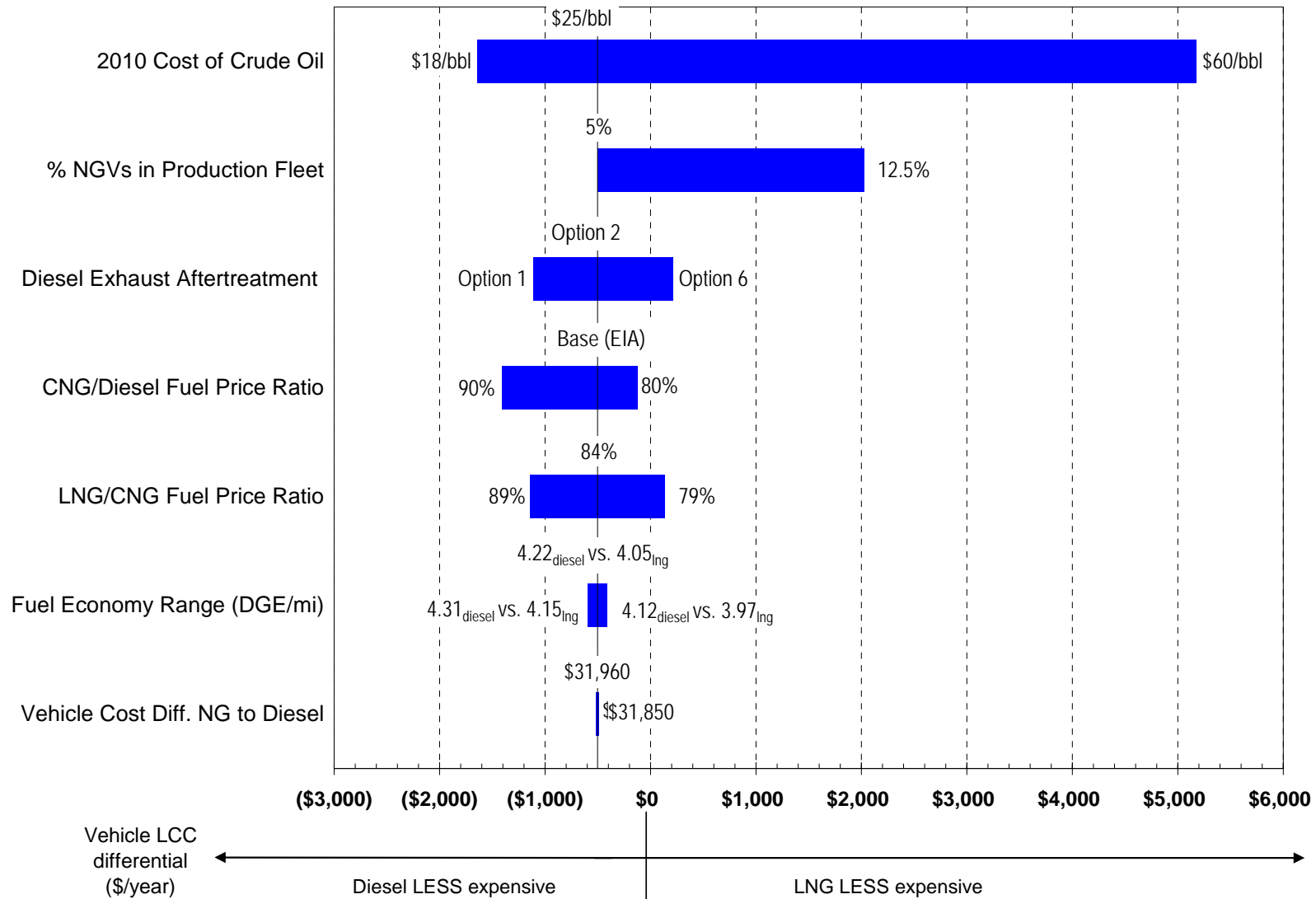
Sensitivity of Refuse Hauler results for LNG compared to CIDI



Sensitivity of Transit Bus results for CNG compared to CIDI



Sensitivity of Short Haul Truck results for LNG compared to HCCI



Significant Finding

- NGVs will be highly competitive with diesel on LCC basis (for “2010” emission engines)
- Vehicle technology costs for 2010 emissions level diesel vehicles have less price advantage over natural gas vehicles than they do today
- LCCs do not show a clear preference for one fuel over another
- Refuse, transit, trucks will have lower LCCs when oil prices over \$30/bbl
- High range of uncertainty with diesel emission compliance technology

